

**Listing of the Claims**

1. (Currently Amended) A magnetic recording medium comprising:
  - a substrate;
  - a non-magnetic spacer material on the substrate;
  - a non-biased soft magnetic underlayer on the non-magnetic spacer material, said non-biased soft magnetic underlayer containing iron, cobalt and boron; and
  - a perpendicular recording layer on said soft magnetic underlayer;  
wherein said non-biased soft magnetic underlayer is inherently magnetically anisotropic.  
acts as a single magnetic domain exhibiting magnetic anisotropy in a plane parallel to the  
surface of the recording layer.
2. (Previously Presented) The magnetic recording medium as recited in claim 1, wherein the thickness of said non-magnetic spacer material is approximately 1-5 nm.
3. (Previously Presented) The magnetic recording medium as recited in claim 1, wherein said soft magnetic underlayer is approximately 150-300 nm thick.
4. (Previously Presented) The magnetic recording medium as recited in claim 3, wherein the soft magnetic underlayer is comprised of alternating layers of an iron-cobalt alloy and tantalum.
5. (Previously Presented) The magnetic recording medium as recited in claim 4, wherein said soft magnetic underlayer comprises three iron-cobalt layers of about 80 nm thickness interlaced with three tantalum layers with a thickness less than or equal to 5 nm.

6. (Previously Presented) The magnetic recording medium as recited in claim 4, wherein said soft magnetic underlayer comprises a first iron-cobalt layer of about 80 nm thickness and a second iron-cobalt layer of about 160 nm thickness having a tantalum layer with a thickness less than or equal to 5 nm therebetween.
7. (Previously Presented) The magnetic recording medium as recited in claim 1, wherein the soft magnetic underlayer is further comprised of one or more layers of a soft magnetic material composed of about 90 atomic percent iron-cobalt alloy and about 10 atomic percent of boron.
8. (Previously Presented) The magnetic recording medium as recited in claim 7, wherein the iron-cobalt alloy is further comprised of about 65 atomic percent iron and about 35 atomic percent cobalt.
9. (Previously Presented) The magnetic recording medium as recited in claim 1, wherein said soft magnetic underlayer further comprises a plurality of alternating layers of non-magnetic spacer material and soft magnetic material.
10. (Currently Amended) The magnetic recording medium as recited in claim 1, further comprising a second non-magnetic spacer material on the said non-biased soft magnetic underlayer.
11. (Cancelled)

12. (Currently Amended) The magnetic recording medium as recited in claim 6, further comprising a second non-magnetic spacer material on the said non-biased soft magnetic underlayer.

13. (Original) The magnetic recording material as recited in claim 1, wherein the non-magnetic spacer material contains tantalum.

14. (Currently Amended) A method of manufacturing a perpendicular magnetic recording medium, the method comprising:

providing a substrate;

directly depositing a non-magnetic spacer material on the substrate;

directly depositing a soft magnetic underlayer on the non-magnetic spacer material; and

directly depositing a perpendicular magnetic recording material on the soft magnetic underlayer;

wherein said soft magnetic underlayer is inherently magnetically anisotropic. acts as a single magnetic domain without any means of biasing.

15. (Previously Presented) The method as recited in claim 14, wherein the step of depositing the soft magnetic underlayer comprises depositing one or more layers of a soft magnetic material comprising approximately 90 atomic percent iron-cobalt alloy and approximately 10 atomic percent boron.

16. (Previously Presented) The method as recited in claim 15, wherein the step of depositing the soft magnetic underlayer further comprises depositing a soft magnetic underlayer having a

iron-cobalt alloy containing approximately 65 atomic percent iron and approximately 35 atomic percent cobalt.

17. (Previously Presented) The method as recited in claim 16, wherein each of said one or more layers of a soft magnetic material is deposited at a thickness less than or equal to about 80 nm.

18. (Previously Presented) The method as recited in claim 15, wherein the step of depositing the soft magnetic underlayer includes depositing layers of a non-magnetic material between said one or more layers of said soft magnetic material.

19. (Previously Presented) The method as recited in claim 14, wherein the step of depositing the non-magnetic spacer material comprises depositing a tantalum layer on the substrate.

20. (Previously Presented) The method as recited in claim 19, wherein the tantalum layer is deposited at a thickness of about 1-5 nm.

21. (Previously Presented) The method as recited in claim 18, wherein layers of non-magnetic material are deposited at a thickness of about 1-5nm.

22-24. (Cancelled)

25. (Previously Presented) The method as recited in claim 14, further comprising the step of depositing a second non-magnetic spacer material between the soft magnetic underlayer and the

perpendicular recording medium.

26-31. (Cancelled)

32. (Previously Presented) The magnetic recording medium as recited in claim 1 wherein said soft magnetic underlayer comprises a plurality of layers of soft magnetic material.

33. (Previously Presented) The magnetic recording medium of claim 30 wherein each of said plurality of layers of soft magnetic material is less than or equal to about 80 nm in thickness.

34. (Currently Amended) A circular magnetic recording medium suitable for use in a magnetic disk drive comprising:

a substrate;

a non-magnetic spacer material on the substrate;

a non-biased soft magnetic underlayer on the non-magnetic spacer material; and

a perpendicular recording layer on said soft magnetic underlayer;

~~wherein said soft magnetic underlayer is inherently magnetically anisotropic.~~

wherein said soft magnetic underlayer acts as a single magnetic domain and has a magnetic easy axis which lies in the radial direction of said circular magnetic recording medium.

35. (Cancelled)

36. (Currently Amended) The circular magnetic recording medium of claim ~~33~~ 34 wherein said soft magnetic underlayer exhibits magnetic anisotropy in a plane parallel to the surface of said

recording medium.

37. (Currently Amended) The circular recording medium of claim 32 36 wherein said soft magnetic underlayer comprises one or more layers of a soft magnetic material.

38. (Currently Amended) The circular recording medium of claim 32 37 wherein said soft magnetic material is an alloy of iron, cobalt and boron.

39. (Currently Amended) The circular recording medium of claim 36 38 wherein said alloy of iron, cobalt and boron comprises  $(Fe_{65}Co_{35})_{90}B_{10}$ .

40. (Currently Amended) The circular recording medium of claim 36 37 further comprising one or more layers of a non-magnetic material interlaced with said one or more layers of said soft magnetic material.

41. (Currently Amended) The circular recording medium of claim 38 40 wherein said one or more layers of non-magnetic material are composed of tantalum.

42. (Currently Amended) The circular recording medium of claim 32 34 further comprising a second non-magnetic spacer layer between said soft magnetic underlayer and said perpendicular recording layer.

43. (Currently Amended) The circular recording medium of claim 32 34 wherein the hard magnetic axis of said soft magnetic underlayer is perpendicular to said radial direction of said

circular magnetic recording medium.

44. (Currently Amended) The circular recording medium of claim 40 34 wherein the anisotropy field of said soft magnetic underlayer is greater than or equal to about 40Oe.

45. (Previously Presented) The magnetic recording medium as recited in claim 3, wherein said soft magnetic underlayer is approximately 200-240 nm thick..

46. (Previously Presented) The magnetic recording medium as recited in claim 3, wherein said soft magnetic underlayer is approximately 240 nm thick.

47. (Previously Presented) The magnetic recording medium as recited in claim 3, wherein the soft magnetic underlayer is comprised of multiple layers of iron-cobalt alloy, each of which is less than or equal to approximately 80 nm in thickness.

Respectfully Submitted,



Dennis M. Carleton  
Reg. No. 40,938  
Attorney for the Applicant

Buchanan Ingersoll  
One Oxford Centre, 20th Floor  
Pittsburgh, PA 15219

Voice: 412-562-1895  
Fax: 412-562-1041  
e-Mail: [carletondm@bipc.com](mailto:carletondm@bipc.com)